

# Climate resilience in Rwanda: evaluating refugees' and host populations' vulnerability to risk

Nfamara K Dampha, Colette Salemi, Wendy Rappeport, Stephen Polasky and Amare Gebreegiabher

**In Rwanda, refugees in camps and host populations often face high risks of climate-related hazards. Recent research assesses the potential of climate risk reduction strategies to reduce injury and loss of life, improve public health and well-being, and protect livelihoods.**

Floods and landslides are two of the deadliest hazards in Rwanda, causing injury, damage to public goods, and destruction of productive land, all of which have long-term economic impacts.<sup>1</sup> All too often the communities at the highest risk of climate-related hazards are those that also have the lowest resilience. Many of the world's refugee camps have limited capacity to adapt to socioeconomic, environmental and climate change impacts.

The majority of the approximately 127,000 camp residents in Rwanda, and their host communities, lack access to sustainable livelihoods which has a detrimental impact on their resilience. Protracted displacement may make certain groups of refugees in camps especially vulnerable to climate risks. UNHCR's policy on alternatives to camps promotes avoiding encampment entirely and pursuing alternative hosting modalities,<sup>2</sup> but the encampment approach is likely to remain for some time. We

must therefore evaluate ways to reduce encamped populations' vulnerability.

In Rwanda, constraints on land availability have resulted in refugee camps being located in remote communities and in areas more likely to experience extreme weather events. The problems are further exacerbated by population density and the increasing local need for productive land. Moving refugee populations out of an established site to a new site is costly and disruptive, and is only undertaken when the government and UNHCR deem it necessary to protect the safety and/or security of refugees and their hosts. Camps in higher-risk areas urgently need risk reduction measures to help communities become more resilient to climate shocks.

## **Data, tools and methodologies**

In an internal study by the authors,<sup>3</sup> we used geographic information system (GIS)

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data to model flood risk for Rwanda and then evaluated this to determine the flood risk for each refugee camp.<sup>4</sup> A similar study examined landslide susceptibility in Rwanda.<sup>5</sup> We also used data on climate-related disaster damage published by MINEMA, the Ministry in Charge of Emergency Management, to help validate our flood and landslide risk models.

When assessing the risk of climate-related hazards in camp-hosting areas, it is also essential to consider the resilience of the host community. Planners can draw on household datasets that provide local information on household location to evaluate the host community's capacity to cope with risks. For example, we used the 2020 Demographic and Health Surveys (DHS) for Rwanda to assess poverty levels within a 15-km radius of each camp. Examining the distribution of the poorest 20% of Rwandan households, we found disproportionately high numbers residing in the areas around Mahama and Mugombwa camps.<sup>6</sup>

### Strengthening resilience to climate shocks

Strengthening community resilience requires looking at climate hazards and local topographic conditions simultaneously. Building climate resilience is best done by designing and implementing solutions in an integrated manner, using hard infrastructure measures and 'nature-based' solutions as well as governance solutions and community-based practices.<sup>7</sup> Climate and disaster risk reduction investments additionally offer pro-poor development benefits.

**Nature-based solutions:** As Rwanda strives to follow a 'green development' pathway, nature-based solutions – also known as green infrastructure solutions – could be adopted in the refugee-hosting districts to enhance development for climate resilience. Nature-based solutions are defined as "sustainable planning, design, environmental management and engineering practices that weave natural features or processes into the built environment to promote adaptation and resilience".<sup>8</sup> Such solutions have been proven not only to contribute to climate change mitigation but also to reduce flood

and landslide risks, prevent soil erosion, improve water quality, protect wetlands, and add recreational space in urban landscapes.

In Rwanda this may entail providing rainwater harvesting systems, restoring natural drainage paths, removing debris in floodways, restoring wetlands, protecting watersheds and protected forest areas, and introducing drought-resistant crop varieties. In flood-prone locations in Kigali and in other refugee-hosting districts (Gatsibo, Karongi, Nyamagabe, Gisagara, Kirehe and formerly Gicumbi), nature-based solutions can help store floodwater, reduce runoff, filter pollutants and allow water to seep into the ground. Other benefits of nature-based solutions may include reducing urban heat and air pollution, improving health and mental well-being, promoting liveability in the urban landscape, and strengthening biodiversity and species richness.

**Hard infrastructure solutions:** In Rwanda's refugee-hosting districts, structural measures may include building floodways, deepening canals, creating reservoirs and establishing public infrastructure. For instance, well-constructed public buildings such as schools could temporarily accommodate disaster victims. Additionally, building reservoirs, canals and rainwater harvesting systems can reduce stormwater damage, store water to intensify irrigated agriculture, and meet the domestic water needs of the population.

**Governance-based solutions:** Governance-based solutions include investment in climate financing and establishing appropriate regulations, policies and plans. These are essential to the implementation of climate change adaptation and disaster risk reduction strategies, and need to be supported by local, national and international stakeholders such as local NGOs, community leaders, civil society, MINEMA, UNHCR and others. Governance support and political will are reflected in the Rwandan government's plans and programmes. Additional governance-based solutions to be considered may include a) increased financing for building community capacities to withstand the impacts of

climate change, b) including refugee and host community data when conducting rapid and detailed disaster impact assessments, c) strengthening local and national early warning systems, and d) conducting detailed resilience planning processes, including cost estimates, systematic and evidence-based studies, and community participation.

**Community-based solutions:** Climate risk reduction strategies should involve community participation from project design and planning to implementation, monitoring and evaluation. Where feasible, local groups could launch public dialogue and community awareness campaigns to foster information exchange at the grassroots level. These may include community hazard-mapping workshops, where detailed contingency plans could be prepared for various refugee-hosting districts. All local stakeholders, including refugees, should participate in community-driven landscape restoration, biodiversity conservation, and climate change mitigation efforts. For instance, community-based associations with refugee membership could introduce afforestation or reforestation projects.

### Risk reduction and refugee camps

As the impacts of global warming intensify, refugees residing in camps will become more vulnerable. In Rwanda's refugee-hosting districts, we recommend that concerned agencies conduct detailed assessments of hard infrastructure and soft (nature-based) infrastructure solutions with an eye to reducing flood risk, minimising landslides and increasing agricultural productivity.

Although we recognise the myriad of competing factors that determine the sites of refugee camps (including political considerations, land availability and proximity to the border), site planners should examine the overall vulnerability of such locations to natural and climate-induced hazards. When debating prospective sites, satellite imagery, geospatial tools and decision analysis methods can help host governments and UNHCR to factor in empirical evidence of site exposure

to risk. Local, tailored investments in resilience building could enhance the well-being of refugees and hosts alike.

**Nfamara K Dampha**

*damph002@umn.edu @Dr\_Dampha*

World Bank Consultant, Former Young Fellow at World Bank-UNHCR Joint Data Center on Forced Displacement<sup>9</sup>

**Colette Salemi salem043@umn.edu**

*@colette\_salemi*

Doctoral student in Applied Economics, University of Minnesota

**Wendy Rappeport**

*rappepor@unhcr.org @wrappen*

Senior Development Officer, UNHCR Rwanda

**Stephen Polasky**

*polasky@umn.edu @JPLab\_UMN*

Regents Professor and Fesler-Lampert Professor of Ecological/Environmental Economics, University of Minnesota

**Amare Gebreegzabher gebreega@unhcr.org**

*@AmareGebreegzi1*

Senior Energy and Environment Coordinator, UNHCR Rwanda

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2 UNHCR (2014) *UNHCR Policy on Alternatives to Camps* [www.refworld.org/docid/5423ded84.html](http://www.refworld.org/docid/5423ded84.html)

3. Contact authors for access to the study and flood risk maps.

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9. The analysis presented in this article was conducted while Nfamara K Dampha was a Fellow of the World Bank-UNHCR Joint Data Center on Forced Displacement, in Copenhagen.